The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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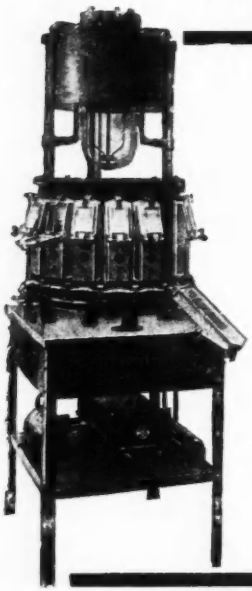

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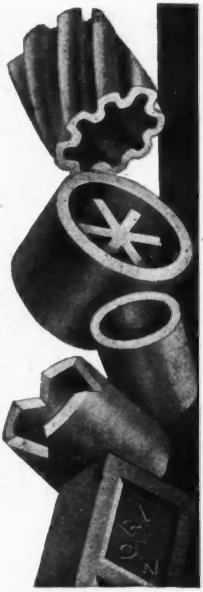

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A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Organisation of Industrial Research

IT has been recently stated that it is becoming impossible to open a newspaper or a technical journal without finding some reference to the need for industrial research. The subject, on a narrow view, may be in danger of becoming static; but the wider, saner view is that the frequency with which the subject is debated is a measure of the awakening of this country to our deficiencies and needs in this field. The prosperity of Britain after the war will depend more than ever before upon the efficiency and progressiveness of our industries. The loss of our foreign investments and the possible diminution of the payments to us from abroad for services rendered, will necessitate a considerable expansion in the value of our exports if we are to increase or even maintain our standard of living. Furthermore, this increase in exports will have to be brought about despite the industrialisation of other countries which before the war were mainly producers of raw materials. Success can only be won if our products are better, more attractive or cheaper than those made by our competitors or in our customers' own country. All this we have pointed out before, and also the fact that our position will be increasingly difficult after the war, because of the increasing reaction of those factors which were already beginning to operate before 1914. Industry is growing abroad and the easy inventions and obvious developments have already been made. Nature now only yields her further secrets as a result of much more prolonged and careful searching. Haphazard inquiry must be replaced by organised and systematic study.

Recognising these hard facts, the Federation of British Industries has recently issued a pamphlet on "Industrial Research—What it means to British Industry," written by Sir Harold Hartley, who in himself embodies both the academic and the industrial outlook. "Research," he tells his readers, "is a habit of mind which makes us attack every problem, big or small, in an orderly, systematic way, using if possible the advantages that modern science can give us. This pamphlet is written in the confident belief that industrial research is going to be the vital factor in determining the future prosperity of Great Britain. Whatever else we do, whatever advantages we possess, research is the key to the future. In a democracy action

On Other Pages

depends on public opinion. Every business man should realise why the need for industrial research is so urgent for Great Britain, what it can accomplish, and how businesses, large and small, can take advantage of it." The necessity for this direct exhortation to business men is justified by the statement that although we in Britain have done a vast amount of work without calling it "industrial research," nevertheless, despite some outstanding exceptions, in this country there has not been a general appreciation of the value of science in industry, and the amounts spent on research have been correspondingly less than in other countries.

All this has been said before many times, but it is well that it should be rubbed in. It is a significant fact that the greater use which the United States makes of scientific knowledge is strikingly reflected in the character of their exports which, to a far greater extent than the exports of this country, are the result of modern invention and design. It is impossible to avoid the conclusion that if this country is to maintain its position in the world markets, our industries must greatly increase their attention to research as soon as the progress of the war makes it possible. There is danger in delay: markets once lost are not easily regained; and industrialists must be taking active steps now to organise this aspect of their post-war activities.

It is well, also, that there should be some explanation to business men, few of whom have had a scientific education on what research entails. Business men shy at it because they regard it as an affair of laboratory test-tubes leading to the production of a report which they cannot understand, upon something that may or may not work in practice, for reasons which they are incapable of understanding when expressed in scientific terms. The more "hard-headed" (a euphemistic phrase meaning generally "tight-fisted") dislike research because it seems to be a species of gambling: you pay your thousands of pounds and you may or may not get a return on the investment. Sir Harold dispels these notions very effectively by saying what he wants industry to do. The twin keystone of his arch are the Research Association for most short-term work and the university for long-range work of a more academic character. It is in the university laboratories, the outposts on the frontiers of knowledge, that fundamental research is mainly done. At any time a new industry may be born there which will meet some new human need. It is in the atmosphere of the university laboratory, too, that the men on whom we shall have to rely as leaders of industrial research are bred and trained. Business, therefore, has a direct interest in seeing that research at universities and in technical colleges is adequately endowed.

So far from research being necessarily expensive, the subscriptions to research associations need not be larger. "This year the total incomes of the associations will be over £800,000, of which £275,000 will be Government grant. The subscriptions vary with the size of the member firm, being in some cases as low as £10 annually for the smallest unit. . . . It was for smaller firms that the Research Association movement was largely conceived, since by co-operative research an annual subscription of, say, £100, may ensure participation in the results of a research expenditure of £20,000 per annum or more." In another place, he says, "The initial step of subscribing to a Research Association is not costly. In many cases a small firm would be assessed for subscription at ten to twenty guineas, and not many of the larger units subscribe more than £1000 per annum. In two typical Research Associations at the present time the average subscription of members is only about £50. For this outlay, the subscribing member participates in research costing 500 times this figure. However, subscriptions to Research Associations must in future be larger in order to give them more adequate resources."

Sir Harold then makes a most important point. The payment of the subscription, he points out, is only the beginning. It is essential, even in the smallest unit, that there should be at least one member of the staff with sufficient scientific training to follow the work carried out in the Research Association and interpret it to his firm. Such a man, too, can be of the greatest value in appraising the results and implications of other published research bearing on his firm's interests, and in general

acting as a scientific adviser and consultant. Such men should be a more common feature of our industries, and they should be accorded a status which will ensure their voices being heard. No firm should be deterred from taking up research merely because it cannot afford in the first instance an expensive laboratory and equipment. It is the quality of the man that counts.

While all this is applicable to almost every concern in the country, the larger firms, as Sir Harold recognises, will set up their own research laboratories as well as joining their industry's research associations. The first step is to decide on the problems which invite attack, the next to decide on the scale of the attack, to find suitable staff, and gradually to make research a recognised part of the organisation. This will take time, as a research staff have to learn their problems. Confidence will be established between them and their colleagues as they show their ability to help in the day-to-day difficulties, "trouble-shooting", as the Americans call it. The long-range problems need patience and only a part of this work can be expected to bear fruit, but it is surprising how quickly research begins to give results, sometimes in quite unexpected directions. In time the whole concern will become research-minded, and in America it is not unusual to find the head of a research department with a seat on the board. It is important to remember that the running costs of research are allowed by the Inland Revenue as a deduction for income-tax purposes. This applies equally to annual subscriptions to Research Associations, except in respect of any entrance fee and specific donations for capital purposes.

Critics have recently pointed out that all this talk about increased expenditure on research appears to suggest that the results of research depend on what is spent on it, whereas everything depends in reality on the *quality* of the work, not on its *quantity*. It will not be forgotten that Sir Harold Hartley has emphasised in his pamphlet that "it is the quality of the man that counts." In another place he says, "The success of a research laboratory depends on the men with ideas. Only experience can show who they are. They may come in as university graduates, as assistants or as laboratory boys. Encouragement and a watchful eye are needed to find them." But those taking the narrow view should also note another remark in this same pamphlet, a remark which is undeniably true. "In both the world wars British scientists have proved that they can more than hold their own if they are given equal facilities and support. All they need is the same opportunity in peace as in war." There are many among our people with a flair for research who have gone through life without their gift having been discovered because they did not have the opportunity—because "no man hath hired them," and because they were never trained to do that work for which they were fitted! The probabilities are that if we spend on research the money that other industrial nations spend, the additional results will justify the expenditure because the necessary men of high quality will be forthcoming.

It has been stated that whereas the total U.S.S.R. budget for science is 1 per cent. of the national income, ours is but one-tenth of 1 per cent., and that of the U.S.A. three-tenths. Taking expenditure by individual American trades we find the ratio of the research budget to gross sales is for radio apparatus 1.6 per cent., for electrical communication 1.4 per cent., and for chemical industry and rubber products 1 per cent., but in the older industries the ratio is much less. Other nations have found research expenditure to be a very paying proposition; let us trust our own people and take the plunge. "Nothing venture, nothing win," is old fashioned; for post-war Britain the proverb should read: "Nothing venture, everything lose."

At the first meeting of the F.B.I. committee formed to consider the subject of British interests in enemy and enemy-occupied countries, Mr. C. F. I. Ramsden, the F.B.I.'s foreign director, said that the question was a much more complicated one than arose after the last war, when about £100,000,000 was obtained from the liquidation of German assets in this country and from transfers by Germany to this country, with the result that British claims were met in full and, in addition, a substantial sum handed over to the Treasury. British investments on the Continent were now far larger, while German assets in this country were likely to prove much smaller.

NOTES AND COMMENTS

RDX

THE chemists of Woolwich Arsenal became headline news last week-end in the lay press, which declared with much gusto that "the secret of RDX" had been released, whereas the real secret, the chemical secret, still remains unpublished so far as we know. The men who experiment with new explosives, like the soldiers of the underground movements on the Continent, must inevitably remain in the background, deriving what satisfaction they can from the knowledge that they contribute with such shattering force to the success of our fighting services. Many of them are members of that much-abused section of the community, the Civil Service, and like other Government scientists, they have occasionally been tarred with the same indiscriminating brush that is used to "black-wash" the whole of that essential institution. They have even been accused by their fellow-scientists, who should know better, of revelling in the secrecy that cloaks their work, even though this secrecy is none of their own choosing, but still remains a vital component of "security."As a correspondent wrote in THE CHEMICAL AGE a few weeks ago, "the scientific staffs of our Government departments should be congratulated on the way they have preserved the facts about our weapons and research from the enemy." Our congratulations this week can be particularised, and we are glad to join in the recognition given to Dr. Godfrey Rotter and his assistants who perfected RDX, five of them giving their lives in the process.

Evening Classes

ONE particular point to which the technical world must give consideration when mapping out plans for improving post-war technical education is the rôle of evening classes. For ourselves, we should shed no tears if they were abolished altogether, for they are both an exhausting and an inefficient means of transmitting knowledge. Exact figures are hard to come by as to the number of students who do complete their courses of evening instruction, but we have heard it said that it is not much above 10 per cent. Were the figure 30, or even 50 per cent., the evening-class student is still put at too great a disadvantage compared with the full-time student at a polytechnic or a university. It is too great a strain for anyone to spend a full day working in a factory or an office and then to spend three hours, four or five evenings a week, swatting for a degree examination. Some idea of the drain that evening classes may make upon a student's mental, and even physical, powers, may be judged from the following instance which has come to our notice. It may be an extreme case, but it illustrates the glaring defects of the system.

A Bad Case

A GIRL chemist, wishing to attend a degree course at a London polytechnic, went to her employers and asked if it might be possible for her to leave work an hour earlier in order to do so. She was given the necessary permission on the condition that she started work at 8 a.m., instead of 8.30. Such an arrangement meant that this girl had to get up at 6 a.m., work all day and then study all the evening, to get home again at 10.30 p.m. We think that girl deserves the apologies of the chemical industry for the way her employers have behaved. Her firm is worthy of congratulation, however, for showing by the neatest *reductio ad absurdum* how pernicious the present system is. The views of the students themselves must inevitably coincide with the recent resolution which the Association of Scientific Workers submitted to the T.U.C., to the effect that all reasonable facilities should be given to young employees for study and technical school training during their employers' time.

Humanity and Common Sense

FORTUNATELY for British industry, not all employers are as purblind as those we have just cited: the majority are good enough business men to see where their true advantage lies. What profit can there be in employing in an industrial laboratory a mentally and physically exhausted worker? Something is bound to go wrong as a result, perhaps something serious. It is

surely better to enlist the loyalty and enthusiasm of such employees as are anxious to improve their status by further study, by showing a spirit of co-operation and by evincing some acknowledgment of the fact that their increased technical experience will be not merely to their own advantage, but also for the benefit of the firm and of the chemical industry generally. Common humanity, singularly enough, is often synonymous with common sense.

Wood Tar

THE story of the by-products from coal tar is now so well known that we expect Macaulay's proverbial schoolboy to be acquainted with it. Wood tar, on the other hand, is a material about which even chemists are vague. As a chemical raw material it does not possess the same qualities as coal tar, and is hardly likely ever to become so important a source of chemical products. On the other hand, intensive research would doubtless result in the derivation of new products from it, and, in view of the fact that wood is a renewable crop, its scientific examination will undoubtedly be intensified as the practice of chemurgy expands. The Americans have already initiated some interesting researches into the destructive distillation of wood, and now the necessities of war have driven the Swedes to undertake similar investigations. Skogsägarnas Olje A/B (Forest-Owners Oil Co., Ltd.), an organisation of 160 producers formed to meet the present emergency, has asked for the assistance of the chemical industry in solving the problem of meeting the heavy demand for tar lubricants from wood tar. Its production has increased considerably of recent months.

Swedish Progress

BEFORE the war wood-tar manufacture in Sweden was a declining industry and the present increased output has resulted from the lack of lubricants and the inaccessibility of producers in other countries. As was the case during the last war, Swedish manufacturers have turned to tar to obtain the lubricants needed by industry and transportation. The company, operating under a Government guarantee, is producing about 20,000 tons of tar annually. It is expected that this figure will be increased to about 25,000 tons, or approximately half the Swedish total, when present plant expansion has been completed. Swedish tar producers are now studying the problem of keeping their plants in production after the war and of finding a market for their products. After the last war, when the demand for tar lubricants ceased abruptly, plants which had expanded were dismantled, sold as scrap or abandoned, and manufacturers are attempting to prevent a similar occurrence after the present war. The establishment of a chemical industry based on wood tar, along the lines of the coal-tar industry, seems to offer the best solution.

Indian Patents

A NOTE in the latest number of *Science and Culture* conveys a hint and a warning as to the way Indian men of science are thinking about patent rights on chemical products, such as drugs which have become scarce because of the war. The paper pointedly quotes two sections of the Indian patent laws for the benefit of those persons who are desirous of undertaking the manufacture of such commodities, but who are "sometimes scared away by possible violation of patents." Under Indian law any person can present a petition to the Central Government asking for the grant of compulsory licences or for the revocation of the patent on the grounds that the demand for the patented article is not being met to an adequate extent and on reasonable terms. Another ground for petitioning the Government comes into existence four years after the date of patent granted in India, if the patented article or process is manufactured or carried on exclusively or mainly outside British India.

The Fushan plant of the Japanese company, Manchuria Light Metals Co., has been expanded to permit a 150 per cent. increase in aluminium production. The company is also resuming construction of its plant at Antung, suspended since 1939.

The mineral wealth of Sardinia, which is now at the disposal of the Allied Nations, includes zinc, lead, copper, nickel and manganese, as well as a little iron and anthracite, and some recently developed kaolin quarries. Adequate water power is available for working the deposits, but port facilities are small.

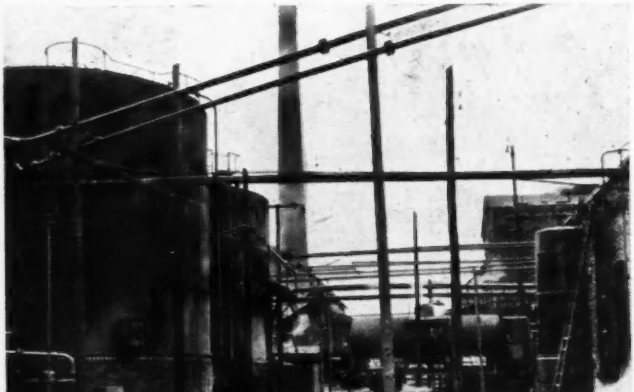
Czech Industry under the Nazis

How the Germans Gained Control

NOWADAYS there is much talk about Germany establishing a second Ruhr in Austria. A similar development is occurring in Czechoslovakia, whose raw materials and industries the Nazis have been exploiting to the maximum extent. Among Czech industries on a Ruhr scale which were predestined to help the German war effort were her coal, iron and chemical industries. Their origins, development and high standard of efficiency were described recently by Mr. Gerald Druce and Dr. George Lewi at a meeting of British and Czech chemists (THE CHEMICAL AGE, June 12, p. 630), and Dr. Cisar, director of the Czechoslovak Research Institute in London has also dealt comprehensively with the subject of the Nazi exploitation of Czechoslovakia.

The Government-owned and operated plants in the seized districts were, of course, taken over by Germany without compensation. This happened with coal mines, silver and lead mines at Pribram and Bánska-Stiavnice, uranium and radium works (Jachimov, Joachimsthal), iron ore mines (Rosnava, Zeleznik, Tisnovec, Hronec and Bánska Bistrica), salt mines in Presov and Slatinské Doly, as well as naphtha and natural gas found at Gbely. Other industrial and mining properties were expropriated with the help of the device called "aryanisation," first being placed in the hands of a Nazi commissar appointed by Berlin, who then manœuvred them into the hands of a German buyer picked by Berlin, and at a price dictated by the Reich authorities. Small wonder that in many cases we find the I. G. Farbenindustrie, the Hermann Göring Werke and similar concerns as the ultimate buyers.

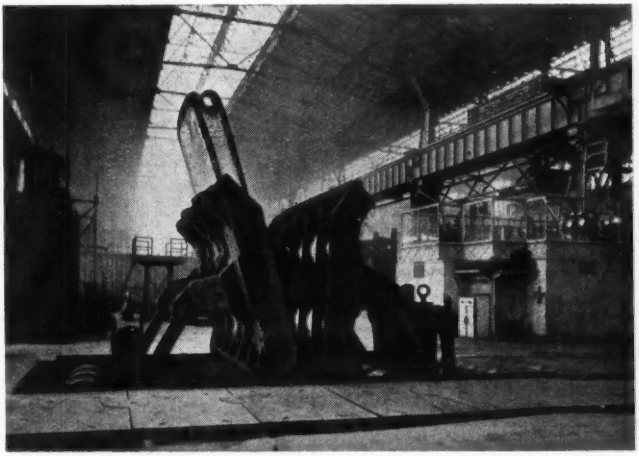
In this way control of industrial, mining and financial concerns of the greatest value passed from Czech to German hands. Now linked to German companies are the largest Czechoslovak chemical works at Ústí (Aussig) and Falkenau, with their subsidiaries Explosia A.-G., Synthesia A.-G., and Kolin Chemical Works, and the nitrogen works in Mariánské Hory. The extensive lignite deposits of north-west Bohemia are to-day being exploited to their full capacity to provide raw material for the manufacture of synthetic rubber, acetylene and synthetic petrol, for the production of which this particular quality of lignite is eminently suitable. This development proceeds under control of the Leuna Works.



Tar works at Vitkovice, Czechoslovakia.

A powerful instrument in this kind of economic conquest was the control acquired over a number of financial institutions by the Deutsche Bank, the largest bank in Germany, and by the Nazi-controlled Dresdner Bank, the bank of the Göring Concern. In Czechoslovakia, as elsewhere in Central Europe, industrial undertakings are directly financed by the banks, which very often own or control the majority of the shares. Thus, by getting control of the banks, the Nazis obtained control of important key positions in Czechoslovakia's heavy industries even before the occupation of Prague.

By gaining control of the banks, the



Iron works at Vítkovice.

Nazis took over a number of outstanding industries, as for instance, the Poldi Steel Works, the largest steel works in Central Europe, manufacturing the world-famous Poldi armour-plated steel, which was used in the tanks that led the chief attack on the French defences in 1940. In peace time the Poldi Steel works employed 5000 workers. This staff has now been increased to more than 8000, and the works are producing at full capacity for the German war effort. The pre-war capital of 125 million was increased to 250 million when the works were incorporated in the Göring concern.

Having thus broken down the defences of Czechoslovak economy and gained important key economic positions in the country, the seizure of the rest of the country's industry after the occupation of Bohemia and Moravia proved a comparatively easy task for the Germans. There were great prizes awaiting them, in particular the great armament works of Skoda at Pilsen, with its electro-engineering, machine building and motor works; the important small arms works of Zborojovka-Brno, where the famous Bren gun originated and which also made heavy machine guns and precision machine tools; the Vítkovice iron works, and the Mining and Iron Foundry Company (Berg und Hüttenwerks Gesellschaft), together with the coal mines of the Northern Railway. All these were taken over by the Hermann Göring concern. The three last-named concerns, which produced enormous quantities of coal, coke, iron and steel in the Ostrava-Karvina district, were united with the great coal and steel-producing plants of Upper Silesia and South-East Poland to form one gigantic combine which the Germans intend to develop as the future centre of their war industry, which they consider invulnerable from the air as it is located far from their western frontiers.

The two pictures of the iron and tar works at Vítkovice and a few figures give some idea of what Germany has gained by looting Czechoslovakia. The Skoda works now employ about 75,0000 workers, and can produce in one department alone 200 heavy guns a month. The monthly production of special steel by the Poldi Steel Works with its 8000 workers is more than 40,000 tons. The Mining and Iron Foundry Company used to produce 470,000 tons of raw steel, over 500,000 tons of ingots, and 424,0000 tons of war material (such as barbed wire) per annum. The annual production of the coal and iron mining areas seized by the Nazis was on an average 20.4 million tons of brown coal, 14.5 million tons of pit coal, 15 million tons of pig iron, and 2 million tons of steel. The capacity of all these concerns has recently been considerably increased.

The acquisition of the Skoda and Bren works was simple for the Nazis; they were largely State-owned and there was no difficulty in making the Government turn over their shares to the Göring concern, which also bought out, after the fall of France, the shares in Skoda owned by Schneider-Creusot. The acquisition of the three large coal and iron concerns in the Ostrava-Karvina district was facilitated by the Polish annexation of this district and by a large part of the shares of Vítkovice being held by the Viennese branch of the Rothschild family. The shares of the other industrial concerns were either "aryanised," or bought in the so-called "free" market, the reluctance of owners who were unwilling to part with their property being overcome by internment in concentration camps, or the threat of it.

Parliamentary Topics

Synthetic Rubber in Britain

IN the House of Commons last week, Mr. Shinwell asked the Minister of Production what progress had been made in the production of synthetic rubber in this country; and what steps had been taken either by the Government or by any company or firm to proceed with the installation of plant for producing synthetic rubber.

Mr. Garro Jones: No steps have been taken to produce synthetic rubber in bulk in this country, but as the hon. member was informed on July 20, discussions are proceeding with a company regarding their plans for its production.

School Laboratory Assistants

Sir A. Southby asked the Minister of Labour whether, in view of the need for the training of a suitable proportion of young men and women in science, he would take the necessary steps to ensure that there should be a sufficient number of laboratory asistants available in schools and training establishments to enable scientific instruction to be carried out. Mr. Bevin said that the existing arrangements had been devised with the object which his questioner had in mind and he did not think that any further steps were necessary. Except where it was established, in consultation with the Board of Education, the Scottish Education Department, or the University Grants Committee, that the workers in question were redundant, they were not withdrawn from their employment until satisfactory substitutes have been provided.

Licences of Paint Manufacturers

Sir John Mellor asked the Minister of Supply on what principles licences were granted to paint manufacturers under the provisions of the Control of Paint Order, etc., and whether he would introduce amending legislation in his next Finance Bill to avoid penalising patriotism in a case of this kind. Mr. Peat replied that licences had been issued to all paint manufacturers with the exception of a few who, so long as they did not exceed their past consumption of materials, did not come within the ambit of the order.

Fertilisers (Serpentine)

Major Studholme asked the Minister of Agriculture whether he had explored the use of serpentine with superphosphate, as is done in New Zealand. Mr. Hudson said that experiments to determine the advantage, if any, of using a mixture of superphosphate and serpentine in place of ordinary superphosphate under conditions obtaining in this country were being made, but he was not yet able to make any statement with regard to the results of that work.

Barrier Creams

Sir E. Graham-Little asked the President of the Board of Trade whether he would reconsider his refusal to permit the purchase by members of the public, even on medical prescription, of barrier creams, produced by a private firm whose name had been submitted to him, in view of the demonstration that these protectives are commonly more effective in preventing the incidence of industrial dermatitis than the rubber gloves which the Ministry continued to supply.

Mr. Dalton: There is nothing to prevent any registered manufacturer of toilet preparations from supplying barrier creams for sale to the public provided that the total value of the toilet preparations which he supplies in any restriction period does not exceed the amount permitted by his licence; nor do members of the public require any permit to purchase any such creams offered for sale. Registered manufacturers may supply these creams without restriction to all the industries mentioned in the second schedule to the Toilet Preparations (No. 3) Order, 1943.

Patent Laws

Mr. Dalton, in answer to another question, said he was aware that there was some criticism of the patent laws, but doubted whether this criticism paid full regard to the remedies already provided against the abuse of restrictive practices. He would be glad to examine specific allegations that patent holders were adopting such measures, but added that in present circumstances a comprehensive inquiry into the Patent Laws would not be justified.

MOLYBDENUM IN SWEDEN

Molybdenum is being recovered on a fairly large scale in the Province of Västmanland, Sweden, at the Kallefallet mine owned by Riddarhytte A/B., states *Foreign Commerce Weekly*. A special plant has been erected at the mine to concentrate the ore, and the company plans to change from one to three shifts in the near future. At the Algruven mine, in the parish of Lillharad, Province of Härjedalen, molybdenum has been uncovered, and developments include a shaft 30 metres deep and a drift 30 metres long. Diamond drillings have been made to a depth of 70 metres. For development and test mining, the owner and the Swedish Government have jointly invested a total of 315,000 crowns.

Aminohydroxy Derivatives

Some Industrial Applications

A LARGE number of syntheses can readily be carried out with the new amino-hydroxy derivatives. For example, they form substituted amides with esters, anhydrides, and acyl halides. They also readily react with alkyl halides, aldehydes, ketones, and carbon disulphide. The aminohydroxy compounds are being used for the synthesis of wetting and surface-active agents, pharmaceuticals, photographic developers, resins, and dyestuffs. In aqueous solutions these compounds absorb acidic gases such as CO_2 and H_2S when cold, and liberate them when heated, and are thus adaptable to many gas-recovery or purification processes. They also appear to have corrosion-inhibiting properties and their higher fatty-acid soaps are of interest as detergents. Many other applications requiring a mild organic base suggest themselves.

In the emulsifying field the higher fatty-acid soaps of these new compounds have many important uses. Each possesses slightly different properties so that the requirements of many industries are met by this group of five new emulsifying agents. For example, one of these compounds is employed in preparing cosmetic creams and lotions which are exceptionally stable and free from yellowing during storage. Another is used in automobile polishes, a third is particularly effective for the production of petroleum naphtha emulsions.

Paste Waxes

2-Amino-2-methyl-1-propanol is probably the most versatile member of this group of emulsifying agents. It has the advantages of a low combining weight, a relatively high boiling-point, and it is one of the most interesting emulsifying agents available to-day for preparing water dispersions of fats, oils, waxes, and resins. The following formula gives an example of its use in emulsion-type paste waxes:

Carnauba wax	14 gm.
Beeswax	14 gm.
Paraffin wax	14 gm.
Stearic acid	5 gm.
Amino-methyl-propanol	2.5 gm.
Water	80 ml.

The first four ingredients are melted together on a boiling-water bath. The amino-methyl-propanol is stirred into the wax melt, the temperature of which should not exceed 100°-105°C. at this point, and the boiling water is added with vigorous agitation. The resulting product is a soft paste which spreads very easily and quickly dries to a film which can readily be buffed. If a paste of greater consistency is desired less water should be used. If a harder final film is desired the proportion of carnauba wax should be increased.

Another example of the use of amino-methyl-propanol is given in the following formula for an automobile cleaner-polish:

Mineral oil (60-80 sec.)	6 gm.
Petroleum naphtha (95°-150°C.)	6 gm.
Oleic acid	2 gm.
Carnauba wax	1 gm.
Amino-methyl-propanol	1 gm.
Diatomaceous earth	11 gm.
Water	73 gm.

The first four ingredients are melted together and the diatomaceous earth is stirred into this melt to make a thick paste. The amino-methyl-propanol and water—mixed together and warmed to approximately 75°C.—are then added to the warm melt with very vigorous agitation. The use of a colloid mill for this operation is said to give excellent results. The proportions of diatomaceous earth, mineral oil, and naphtha may be varied within a reasonable range depending on the grades of the ingredients used and upon the characteristics desired in the cleaner-polish.

Naphtha emulsion shoe-cleaners which have no tendency to develop yellow spots or "patches" are made with 2-amino-2-methyl-1,3-propanediol. For example:

High viscosity methyl cellulose	1 gm.
Water	100 ml.
Amino-methyl-propanediol	2.3 gm.
Stearic acid	6.2 gm.
Low-boiling naphtha	200 ml.

The methyl cellulose is dispersed in the water and to this dispersion is added the amino-methyl-propanediol. The stearic acid is dissolved in the naphtha and this solution is poured into the methyl cellulose dispersion and thoroughly agitated. Better mixing can be obtained with a homogeniser, particularly in larger batches.

Cosmetic creams and lotions formulated with amino-methyl-propanediol are claimed to have superior stability in colour and consistency. For these uses a specially refined cosmetic grade has been developed. The soaps of this aminohydroxy compound have high emulsifying power and have no odour which will interfere with perfuming the final product. In addition to these advantages, such creams are free from oil "leakage." The following formula illustrates the use of this new emulsifier in a vanishing cream:

	Parts by weight.
Stearic acid	25.0
Spermaceti	5.0
Amino-methyl-propanediol	1.5
Glycerine	8.0
Water	60.5

The amino-methyl-propanediol, glycerine,

and water are heated together to about 75°C., while the stearic acid and spermaceti are heated in another container. When both mixtures are at the same temperature and homogeneous, the stearic acid/spermaceti mixture is slowly and thoroughly stirred into the aqueous solution. The temperature must be maintained at approximately 75°C. throughout this operation. After the acid/wax melt has all been added, heating is discontinued. However, vigorous stirring is maintained until the mixture thickens, at which point the stirring should be slowed down and changed to a kneading action. Like all stearate creams, this should be allowed to stand overnight and then thoroughly remixed. The finished product is smooth, moderately soft, and brilliantly white. In addition to its use as a vanishing cream, it may also be used as a base for pharmaceutical ointments. Brushless shaving creams may be made by using the same general type of formula except that spermaceti is replaced with a somewhat smaller amount of mineral oil and the proportion of amino-methyl-propanediol is increased somewhat to facilitate rinsing.

Toilet Preparations

Hand lotions that are white, stable, creamy, and easily rubbed into the skin are made with amino-methyl-propanediol:

	Parts by weight.
Stearic acid	4.0
Cetyl alcohol	1.0
Butyl stearate	3.0
Amino-methyl-propanediol	0.8
Quince seed	0.5
Water	90.7
Preservative	as required.

A thick cream is made from all the above ingredients except the quince seed, preservative, and half the amount of water specified, using the technique described for the vanishing cream. The quince seed is soaked overnight with the rest of the water and the preservative, strained, and the resulting "mucilage" is stirred into the cream. The lotion thickens considerably after standing several days and may be thinned with water as desired. Perfume is usually added as a highly concentrated solution in specially denatured alcohol, in the last stages of manufacture.

These and many other cosmetic preparations of the emulsion type are being improved with amino-methyl-propanediol. The formulæ given above are representative and the changes necessary to adapt this new emulsifier to other products will readily suggest themselves to the experienced formulator.

Mineral oil emulsions can be prepared according to the formula which follows. Such emulsions are suitable for use as liquid cleansing-cream bases, for oil dressings, or for lubricants in certain textile applications.

	Parts by weight.
White mineral oil	43.0
Stearic acid	5.1
Amino-methyl-propanediol	1.9
Water	50.0

The acid is melted in the oil at about 65°C., and the amino-methyl-propanediol is dissolved in the water at the same temperature. The oil acid mixture is poured into the water solution with agitation and the emulsion is stirred occasionally while it cools.

Other emulsions of widely varying types may be prepared with aminohydroxy compounds. A stable paraffin wax emulsion, for example, can be prepared with *tris*(hydroxymethyl)aminomethane. This emulsion will stand dilution with many volumes of water without breaking. Among the other products which are being improved through the use of these compounds are numerous textile specialities, polishes, cleaning compounds, leather dressings, "soluble oils," and other emulsions of oils, fats, waxes, and resins.

EXPORT ORGANISATION FOR TAR ACIDS

A company, known as Pamtas, Ltd., has been set up to act as a central organisation for producers and merchants in the United Kingdom in connection with the sale and export of tar acids to the United States, etc. The registered number of the company is 382,802. The original number of members is 100, each liable for £1 in the event of winding-up. The company is limited by guarantee, without share capital. "Producer" members must be nominated by the Association of Tar Distillers, and "Merchant" members by the British Chemical & Dyestuffs Traders' Association, Ltd. The subscribers to the memorandum of association are: N. H. Graesser, Chemical Works, Sandycroft, nr. Chester; Low Temperature Carbonisation, Ltd.; Monsanto Chemicals, Ltd., P. R. Chemicals, Ltd., Scottish Tar Distillers, Ltd., Yorkshire Tar Distillers, Ltd., Tar Residuals, Ltd., James Miller, Son & Co., Ltd., Cyanamid Products, Ltd., and Brotherton-Ratcliffe & Co., Ltd. The first "Producer" directors are: W. A. Bristow, A. D. Daysh, W. C. Forbes, N. H. Graesser, L. Hilton and H. E. Sugden. The first "Merchant" directors are: F. A. Waugh, I. D. Orr, K. C. Gant and T. B. Hotham. Solicitors: Stephenson Harwood & Tatham, London, E.C.2.

Shortage of salt in the State of S. Paulo, Brazil, will be met by imports from the Argentine and by increasing the output of the salt pans at Cabo Frio. Salt will also be produced by evaporation at Santos.

A Great Biochemist

Retirement of Sir F. G. Hopkins

Sir F. G. Hopkins, O.M.

AN association with biochemical research lasting 45 years has been broken by the retirement of Sir Frederick Gowland Hopkins from the Sir William Dunn professorship. It was in 1913 that Cambridge University started a separate department of biochemistry. This was the first of its kind in the whole world—and it is Sir Frederick who is so largely responsible for having built up the great world-wide reputation of the "Cambridge School" of biochemists. At one time it was said in scientific circles and with little exaggeration, "Hopkins *is* biochemistry."

Among his pupils and the scientists who did research work in his laboratories are to be counted such names as those of Dr. Joseph Needham, Albert von Szent Györgyi, Professor John Mellanby, Sir Edward Mellanby, Professor J. R. Marrack, and V. B. Wigglesworth.

Early Work

Sir Frederick was born in 1861. His career did not follow the normal comfortable continuity of school, university, graduation and research. Owing to the early death of his father, he had to start work in an insurance office when he left school. By the time he was 17, however, he had been able to move into a job which offered some slight prospects for him to follow a scientific career; he became apprenticed to a consulting chemist. The fact that he did not learn one word of theoretical chemistry during his three-year apprenticeship led him to attend chemistry classes at South Kensington and University College, London, and these classes, representing his first basic training in science, enabled him to qualify for the fellowship of the Institute of Chemistry. He next joined Dr. Thomas Stevenson, an official analyst to the Home Office with a laboratory at Guy's Hospital. After spending five years with Stevenson, his work being concerned with the detection of poisons in criminal cases, he became a student—he was then in his 27th year—in the medical school of Guy's Hospital. While qualifying for his M.B. he continued to do a good deal of research and in 1894 received his D.Sc. It was in 1898, when it seemed likely that he would follow a medical career as a clinician, that he was invited by the professor of physiology at Cambridge, Sir Michael Foster, to join his department with the object of putting into effect a curriculum of teaching in physiological chemistry.

Hopkins's first important researches were concerned with the yellow pigment, known as pterin, that is found in the wings of butterflies. At Guy's Hospital he perfected a technique of estimating uric acid in urine which quickly became the standard method, and he later studied the chemistry of the urine pigments. He next became interested in proteins, and was able to add to the small number of pure proteins that had been isolated by preparing a crystalline egg albumen. Two years later he isolated, in conjunction with S. W. Cole, that important constituent of many proteins, the amino-acid known as tryptophane. In 1905, he was elected a Fellow of the Royal Society. Then, working with Fletcher, he studied the formation of lactic acid in muscle and so laid the foundations of our knowledge of the chemical phenomena that accompany muscular contraction.

The Clue to Vitamins

Investigation into proteins led on to feeding experiments, which not only proved that tryptophane is essential to animal growth, but also gave Hopkins the clue that led to the discovery of vitamins. Arising from these early feeding experiments came his statement, made as early as 1906 in a speech to the Society of Public Analysts, in which he hinted at the existence of these accessory food factors. He said that "no animal can live upon a mixture of pure protein, fat and carbohydrate, and even when the necessary inorganic material is carefully supplied the animal still cannot flourish. The animal body is adjusted to live upon plant tissues or the tissues of other animals, and these contain countless substances other than the proteins, carbohydrates and fats. Physiological evolution, I believe, has made some of these well-nigh as essential as are the basal constituents of diet. The field is almost unexplored; only is it certain that there are many minor factors in all diets of which the body takes account. In diseases

such as rickets, and particularly in scurvy, we have had for long years knowledge of a dietetic factor, but though we know how to benefit these conditions empirically, the real errors in the diet are to this day quite obscure. . . . I can assert that later developments of the science of dietetics will deal with factors highly complex and at present unknown." In 1912, he published the results of those now classical experiments which showed the presence of one or more accessory food factors in milk, experiments which threw a new light on the study of diet and deficiency diseases, at that time a very confused field of research and speculation. His researches gave a lead which other scientists were quick to follow. By 1915, McCollum and Davis had proved conclusively that there were at least two vitamins (" fat-soluble A " and " water-soluble B "); by 1932, vitamin C had been chemically identified, and a year later it was synthesised; the existence of vitamin D and vitamin E was recognised within 10 years of Hopkins's earliest discoveries. When one looks through the enormous literature of vitamin research, it is hard to realise that only thirty odd years have elapsed since vitamins were first discovered.

The Biochemistry School

His facilities for research were greatly improved when, in 1921, the trustees of the Sir William Dunn estate decided to provide the funds for the foundation of a school of biochemistry, housed in a separate building that was opened in 1925. Sir Frederick's later researches have been mainly concerned with the study of enzymes that control the oxidation and reduction processes in living tissues. In 1921 he isolated glutathione, the compound composed of three amino acids which plays the part of oxygen carrier in most living cells.

His vitamin researches brought him the Nobel Prize 1929, which he shared with Eijkman. From 1930 to 1935 he was president of the Royal Society; from this body he has been the recipient of both the Royal and the Copley medals. As a member of the Medical Research Council, and also of the Agricultural Research Council, he has rendered inestimable service to the State and to science. His knighthood, in 1925, was followed ten years later by the conferment of the Order of Merit, an honour which as one of our greatest scientists he richly deserved.

Personal Notes

MR. J. D. WOLFF has retired from the chairmanship of the London Metal Exchange after having held that position for 15 years. He is succeeded by MR. P. W. SMITH, a director of H. J. Enthoven & Sons, Ltd.

MR. ANDREW GRAHAM STEWART has been appointed deputy chairman of Stewarts & Lloyds, Ltd., in addition to Sir Nigel Campbell, who has been deputy chairman since 1936. Mr. Stewart, who is 42, has been on the board for 12 years; for two years he has been in charge of tube-production.

Obituary

The death is announced of MR. H. POWELL, chief chemist and metallurgist to the Associated Equipment Co., Ltd., of Southall, on September 15. He had been with the firm for 22 years.

PROFESSOR ARTHUR AVERY READ. T.D., D.Met. (Sheffield), D.Sc. (Wales), F.C.S., F.I.C., Emeritus Professor of Metallurgy, University College of South Wales and Monmouthshire, Cardiff, died suddenly at Bournemouth on September 24, aged 75. A native of Honiton, he was educated at Exeter Grammar School, Owens College, and Sheffield University. He came to Cardiff in 1894 as the first lecturer in the new department of metallurgy and started the work of his department in two basement rooms, with a grant of £100. A few months before his retirement in 1933 he saw his building scheme completed, thanks to the generosity of the Monmouthshire and South Wales Coalowners' Association. His published research work, notably on "The Carbides in Special Steels," had long established his reputation among metallurgists, and the affection and esteem in which he was held by his students is commemorated by the Read Prize in the University of Wales.

SODA FACTORY FOR BRAZIL

The Federal Government of Brazil has approved a resolution of the Federal Council of Foreign Trade that a national caustic-soda industry should be set up in Brazil as soon as possible, and that a factory using the Solvay process should be built at Cabo Frio where the two essential raw materials —salt and lime—are found. The resolution recommended that the installation and operation of the factory should be entrusted to a company, 51 per cent. of whose capital would be subscribed by the Government through a special organisation; also that a contract should be concluded with U.S. interests for planning the factory, which should have an annual capacity of 50,000 tons of carbonate of soda, of which 25,000 tons would be used to manufacture caustic soda. It is also reported that the Government has agreed to grant exemption from customs duties on equipment to be imported by a national chemical concern for the purpose of installing a caustic-soda factory at the port of Angra dos Reis, State of Rio de Janeiro.

Metallurgical Section

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Progress in Antimony Recovery

Types of Furnace Recommended

by A. G. AREND

ANTIMONY represents a metal which is more widely in demand in war time than for ordinary peace-time activities, either alone, or in conjunction with other metals. The splintering of different forms of projectiles into hard and sharp particles, and all associated research, takes the behaviour of antimony as the basis for comparison. Unlike most other metals, there are no really accurate statistics of the world's production of antimony, and all figures that can be obtained are only to be taken as a relative guide. A survey of the outputs from different countries soon reveals that approximately two-thirds of the metal comes from China. Unfortunately, the Chinese mines are at present largely in enemy hands; hence it has become necessary to look to other sources to ensure the present demand being fully supplied. This, however, does not represent a matter of such seriousness as does the supply of tin, a metal which cannot be readily replaced, whereas much antimony can be released by discontinuing its use in the manufacture of office furniture, and other commodities which can be dispensed with during wartime.

China's Output

In 1924, China produced 12,059 tons of antimony, out of a world total of 17,475 tons, and in 1929, 22,401 tons out of a world total of 31,586 tons. But a slump then occurred which lasted until 1934, when China produced 15,548 tons out of a world total of 21,387 tons. With the advent of the war between China and Japan no further complete statistics could be obtained, but it is known that great developments have since been made both in the U.S.A. and in Mexico, where fresh deposits were opened up, while every effort has been made to expedite the reclamation of scrap and secondary metals. A considerable proportion of the small amount of antimony that is directly smelted in this country is derived from associated lead and tin materials, and the few natural deposits here appear to have been worked out.

Initial Smelting

Whereas electrolytic methods are used in the final stages of refining most non-ferrous metals, the purification of antimony depends on pyro-refining, which provides the desired "star" characteristic of the popular brands of the metal. The initial smelting work comes under two categories, namely, the precipitation method, and the volatilisation process, both of which have been improved of recent years. Although smaller refiners persist in using adaptations of reverberatory furnaces, more success is attained on the large scale by blast-furnace practice, though the construction of the latter type of furnace has to be modified to suit the conditions. Thus the furnace used for the precipitation method is designed to give the familiar hot bottom and cool top, whereas for the volatilisation process an alternative state of affairs is advantageous, *i.e.*, a preferably hot top, so as to facilitate further the removal of the gasified products. In actual practice, the precipitation of antimony from the fused sulphide by the addition of iron is not always as simple as might be gathered from a written description, as the specific gravities of the two main constituents are so nearly alike and do not always give the desired clean separation. Antimony sulphide has a specific gravity of 4.6 while that of iron sulphide is 5.0, but this varies to a small extent according to the impurities which are present. By the

precipitation method much of the product is produced by the interaction between metallic iron and the sulphide of antimony, but at the hot zone of the furnace not a little of the antimony set free is volatilised. It was for this reason that instead of attempting to rectify the trouble, the converse system, of intensive volatilisation, was followed, the blast and the furnace dimensions being altered to that end. Antimony rarely passes into slag except to the extent of a few points per cent., a feature which is

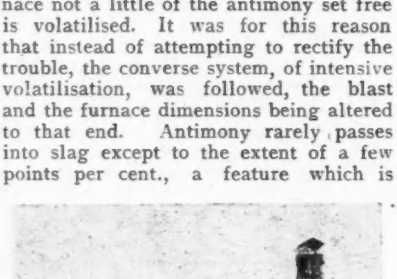


Fig. 1. The mine-head of an antimony deposit, Taiping, China.

rarely met with in other smelting systems, and which strangely enough does not appear to be well known. (In one instance that happened in the smelting of precious metals it transpired that where the antimony could not be accounted for, it was assumed to have passed to the slag, and without having been checked by chemical analysis, reports of the antimony as "taken by difference," were sent to the directors of the firm.) One feature of value where antimony is smelted or precipitated in the metallic condition is that the crucible, or bottom of the hearth, is invariably clean, and does not build-up and require periodical scraping out.

Most of the raw material is represented by sulphide of antimony ores, concentrates, and residues, but charges also include oxidised materials. For the precipitation process, one charge commonly used comprised 810 lb. ore, 550 lb. limestone, and 350 lb. scrap iron, and consumed some 350 lb. of coke. The nature of the ores and residues seldom necessitates any initial briquetting process. The lime content has to be varied to suit the siliceous nature of the ore, in order to furnish an easily fusible slag. As it is desirable to precipitate as much antimony as possible, care has to be taken to see that the resulting metal which is tapped contains from 5 to 7 per cent. of iron, which is later worked out. If this is not done, some undecomposed ore may remain, which will increase unnecessarily the proportion of metal volatilised. One of the chief troubles in earlier years with this form of smelting was that too little attention was paid to the initial heating of the blast-furnace lining. For the best practice it is necessary to give the empty hearth a lengthy warming treatment, so that the refractories are well soaked in heat. This is necessary because antimony is one of the poorest metals for conducting heat, possessing only half the relative conductivity shown by lead. Fortunately, it has what are termed good "cutting" qualities, *i.e.*, it runs thin and removes any secretions which may form. On the other hand, this same easy fluidity and corrosive character used to play havoc with the furnace linings, and particularly the crucible, or bottom; to-day, the linings are made of selected chromite preparations with fireclay underneath. Where reverberatory hearths are used, the fireclay linings previously used were found to sweat in the antimony vapours, and caused aluminate and silicate of antimony to form which later broke off and entered the smelted mass.

Modern Furnace-Types

For this reason, modern reverberatory furnaces have the side walls above the bath level, while the roof is constructed of magnesite refractories. One hearth of this kind made a provision for contingencies in the shape of a collecting receptacle placed beneath the bottom arch, underneath the actual hearth. This was because there were so many instances of the bottom linings being broken through. On the other hand, well-jacketed blast furnaces to-day give little trouble, and the smelting can be carried on for many months without interruption.

The first charges comprise slag only, foul slags known to contain nodules, or pieces of the actual metal from previous charges, being run through until a fixed average temperature has been reached. The crucible is next allowed to fill up

until the molten slag almost reaches the tuyeres, the slag then being run out to give the surrounding linings the desired soaking in heat. As a rule, special tapping methods are employed to assist in making a good separation of the metal from the slag, while the "skulls" which remain in the slag pots and which may hold mechanically as much as 3 per cent. antimony are returned to the furnace. Since the antimony smelted in this manner is purposely made to contain a few per cent. of iron as a precautionary measure, the tapped metal is then smelted in a reverberatory hearth with a small, calculated, proportion of sulphur material, frequently in the form of pure ore. The dross is then skimmed off after tapping, allowed to cool, and broken up into pieces not much larger than walnuts in size.

The starring of the antimony is then performed, which to this day is still performed in crucibles, although the latest practice is to employ a specially-constructed furnace in order to obviate the high cost of these vessels. Crucibles formerly used were of about one hundredweight capacity, into which 98 lb. of the metal cubes, and about 4 lb. of flux could be charged. Under the best conditions this treatment was completed in a matter of 45 minutes. With the improved furnace, the same process is followed, but a larger tonnage is worked at each charge, necessitating less labour. The flux used is probably unique for ordinary metallurgical practice, comprising a carbonate of potash slag, which after use requires to be carefully handled as it tends to become not merely hygroscopic, but even deliquescent. Tapping

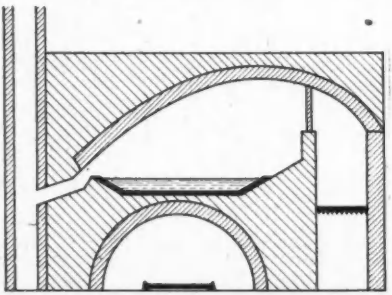


Fig. 2. One design of reverberatory furnace used for processing antimony ores.

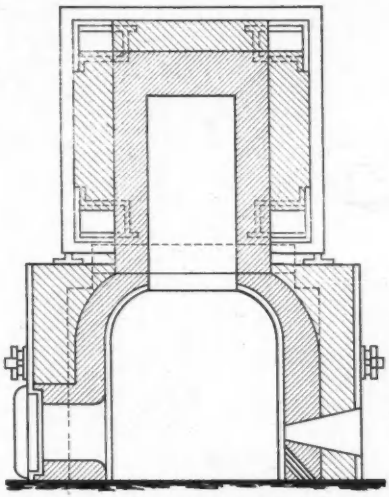


Fig. 3. Type of adapted blast furnace used for the volatilisation process, showing arrangements for maintaining a heated top.

is so performed that a skin of slag remains on the surface. The skin of slag is chipped off, and what little remains is then washed off, since if this is not done, the antimony will lose its bright appearance and show a stained surface. The moulds used are equipped with a special lip, together with a small side reservoir.

The volatilisation process appears to be more suitable for operating on a large scale, but involves much more care and attention in the setting-up of the fume collecting equipment. Strange as it may appear, the great accumulation of flocks of antimony oxide have offered practical difficulties when electrostatic precipitation, which has enjoyed such wide popularity in other smelting systems, has been tried, and for this reason extensive bag-house collecting systems have been developed. What electrical precipitation methods have been used required good mechanical action, so as to shake off appropriately the oxide, which accumulated on the rods, and tended to prevent the current from acting further. The collected fume is composed of oxide and sulphide antimonial material of light disposition containing from 10 to 15 per cent. of sulphur. This material is periodically removed and

placed in a capacious kiln where the sulphur content is first burned out, as far as possible, and then allowed to smoulder until only the clean oxide remains. One kiln that was used had a fire-grate at one end with a number of portholes which gave the bulky mass a good opportunity to receive the heat without delay, after which the fire was allowed to burn out, while the mass was left to smoulder. In the smelting, the charge benefits from the improved oxidising conditions and the fact that the blast-furnace operates with a hot top; this is in contrast to what happens in the precipitation process.

The furnace used in some instances is really an adapted blast-furnace, or improvised hearth, so that the charges may be evenly charged over the glowing coke every half hour. Each charge consists of about 2½ cwt. of ore together with a sufficient amount of fuel, while the clinker that forms is withdrawn from portholes located at the sides. The oxide evolved is collected in capacious woollen bags equipped with valves which can be opened in rotation so that one unit at a time may be emptied without interfering with the process. In one plant the bag-house contained 25 bags, each 13 feet in length and 20 inches in diameter. Nowadays, the sulphur dioxide evolved is registered by means of an automatic recorder, so that the smelting may be maintained according to a strictly regulated plan, which was introduced into general practice only since the beginning of this war.

The Final Treatment

Before reaching the bag-house, the hot gases from the furnace pass through a water cooling-system; at the same time cold air is introduced from outside, and by these means the temperature is not allowed to exceed 66° C. The collected oxide is made up into 10-cwt. charges with the addition of soda and carbon, in the form of pulverised charcoal, and smelted at a comparatively low red heat, after which the antimony is brought to the proper temperature to star, *i.e.*, after the flux has removed any impurities present. It is largely because this final reduction to the metallic condition is so simple and direct that the volatilisation process has become so popular, whereas with the precipitation process many small troubles arise in separating metallic particles, manipulating the ladles, and re-arranging the fluxes in order to produce the desired slag. (This slag was supposed to be maintained at a composition of about 41 per cent. silica, 28.5 per cent. lime, and 27.5 per cent. iron oxide, leaving a small margin for other constituents, whereas by the improved volatilisation process, all slagging difficulties disappear, and the clinker that forms, which is purposely reduced to an absolute minimum, is removed and re-smelted.)

Apart from its use in shrapnel, even long years before the war the inclusion of antimony sulphide and other antimony compounds for producing a dense cloud of white smoke on bursting was well known. For peace-time uses, a large demand is likely to be necessary to meet the requirements of the automobile, rubber-vulcanising, match, and enamelling industries, not to mention the printing industries, when the present conditions have expired.

NEW STEEL HARDENERS

The Technical Committee of the American Iron and Steel Institute recently announced the details of five new "blended hardeners" for steel. These hardening agents may be used interchangeably in accordance with manufacturers' directions, and each appears to improve hardness and strength without undue sacrifice in ductility, in much the same manner as the conventional alloying elements like chromium and molybdenum. Except for small percentages of aluminium, the new agents contain no critical materials. Boron is present in each, and four of the five utilise one or more of the following chemical elements; calcium, manganese, silicon, titanium or zirconium. The most spectacular result of the committee's investigation, which was undertaken at the request of the War Production Board, was the discovery that these new agents have the ability, as yet unexplained, to intensify or "pep up" performance of certain of the lean alloy steels to the point where they are equal to other steels of much higher alloy content.

A new chemical plant is to be erected near Lisbon for the production of sodium and calcium sulphites, and potassium metasulphite. Under the terms of the concession granted to the Sociedade Agricola e Industrial de Productos Quimicos, the factory must start operating before October, 1944.

The Sampling of Zinc Skimmings

An Essential Preliminary to Analysis

by D. J. BULLIVANT, M.Inst. Met.

SAMPLING necessarily precedes assaying, and is carried out in order to obtain a correct representation of the entire bulk. The utmost care and vigilance is necessary in sampling the zinc skimmings because, if the process is conducted in an incorrect or slovenly manner, the final amount taken may not be representative of the entire quantity, and subsequent analysis, no matter how carefully conducted, is rendered absolutely worthless.

With hand sampling, the common-sense and honesty of the manipulator are important factors in the method of procedure; briefly, the process consists of first obtaining from the whole load a quantity, which should be as representative as possible, equal to about one-twentieth of the aggregate. This is subsequently reduced by the method of coning and quartering until the final sample is obtained.

Careful selection is necessary in obtaining the first 5 per cent. of the whole heap. If large pieces of semi-metallic skimmings obstruct mixing they must be reduced in size by means of a rock breaker or roller and the quantity thoroughly mixed by means of a shovel and thrown out into the form of a ring; then, starting from the external circumference, the ashes are thrown into the centre in the form of a cone, taking care to pile each shovelful on the apex in order that it may distribute itself evenly when falling. The cone is flattened in such a manner that the apex is kept as central as possible, drawing two diameters at right angles to each other. The opposite quarters are rejected (Fig. 1). The remainder of the flat-

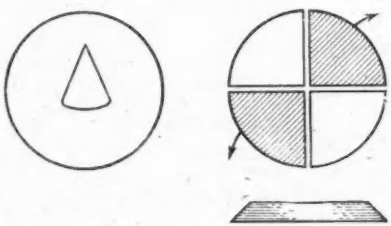


Fig. 1.

tened cone is mixed and the process repeated until a final sample of the necessary weight is obtained. No exact instruction can be given for crushing, but it will be obvious that a final sample cannot be representative unless in a fairly fine state of division; reduction in the size of particles is therefore necessary between each operation of coning and quartering.

A simple method for the distribution of any metallic zinc throughout the sample is made by the employment of a sampling shovel. The use of this will be readily seen

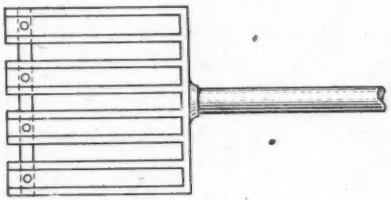


Fig. 2. Sampling Shovel.

from Fig. 2. The zinc is first separated from the heap by means of the shovel and melted in a ladle. This is poured, a little at a time, on to a bucking plate (Fig. 3),

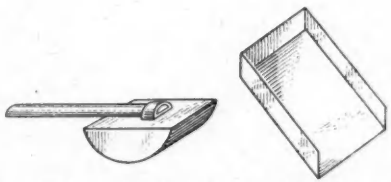
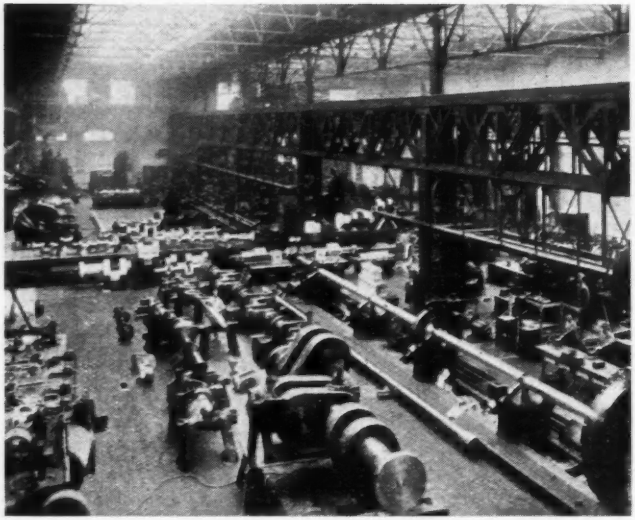


Fig. 3. Bucking Plate and Hammer.

lightly covered with "fines" and quickly crushed with a hammer. Usually, if the temperature has not fallen below the hot brittle range, the zinc will lend itself to being crushed very finely. When all the metallic zinc has been absorbed in this manner, the resultant fine powder may be taken for subsequent analysis.

Density of cast indium, 99.9 per cent. pure, is 7.281 gm. per cubic cm. at 22.6° C., state two American chemists, P. Hidnert and M. G. Blair, in the *National Bureau of Standards Res. J.* (June, 1943, Vol. 30). Their measurements gave coefficients of cubical expansion of 77×10^{-6} and 101×10^{-6} respectively for the two temperature ranges 0 – 25° C. and 25 – 50° C.; owing to indium's anisotropy the linear coefficients are not equal to one-third of these figures.



THE SKODA STEEL WORKS

The accompanying illustration of the crankshaft shop at the Skoda Steel Works, Plzen (Pilsen), in Czechoslovakia, supplements the photographs in the earlier pages of this issue and gives an idea of the potentialities of the industry that the Nazis have absorbed into their war organisation.

ALUMINIUM IN BRAZIL

Brazil is making considerable progress in the exploitation of its large deposits of bauxite and development of an aluminium industry. One establishment under construction has a rated capacity of 5000 to 6000 tons of aluminium annually. Initial production of metallic aluminium is expected to amount to 2000 tons annually. Power will be furnished by a hydroelectric plant with a capacity of 14,500 h.p. Motives for these projects are the desire to exploit more fully Brazil's immense bauxite deposits, and to ship aluminium to the United States as a contribution to the war effort. In addition, the Government aims eventually to establish an aircraft-construction industry based on its own aluminium supplies. Brazil has 81 known deposits of bauxite, estimated at about 150,000,000 tons. The largest, estimated to contain 120,000,000 tons of unusually high metallic content, is located near the health resort of Poços de Caldas, in the State of Minas Gerais. It is at present entirely surface-worked and is said to yield an average of 1 ton a day per miner. —*Foreign Commerce Weekly.*

Substitution of steel for brass in the manufacture of military cartridges in America will be expedited by the gift to the U.S. Government of a patent for this process. The donors are the Western Cartridge Company of Illinois, a firm with long experience of producing cartridge cases of copper-clad steel.

SPANISH CHEMICAL DEVELOPMENTS

The Spanish Ministry of Industry and Commerce has received application for the construction and extension of many chemical and allied works, according to an official list in the April issue of *Ion*, the Spanish chemical monthly. Among these may be mentioned several factories dealing with various branches of the oil industry, including an extension of the linseed-oil works of the Sociedad R.A.P.S.A., Ltda., at Pasajes (San Sebastian) to produce 4000 kg. extra per day; and new factories at Lucena (Cordoba) and at Durcal (Granada) for the production of glycerine from olive-oil waste. The first of these is an addition to the waste olive-oil plant of La Orujera Lucentina, and would treat 5000-6000 kg. of oil per 24 hrs. in a continuous process; the second (Ignacio Puertas) is to treat 1000 kg. of waste olive-oil per 8-hour day. Another glycerine and soap factory is projected in Madrid by A. Ortiz-Palacios, to turn out 10,000 kg. of 86/88 per cent. glycerine per annum.

Ferrosilicon Factory

Ferrosilicon to the amount of 75 metric tons per month is the proposed output of the new Santander factory of A. A. Gonzalez; and J. S. Lasanta has applied for authorisation to manufacture 15,000 kg. of synthetic lacquer annually at Vitoria. Numerous other factories for perfumery and pharmaceutical specialities are projected.

Canada's Base Metals

Remarkable Increase in Production

THE veil of censorship which has so long been lowered over Canadian base-Metal production statistics has at last been lifted and the following figures (in tons) covering the year 1942 may now be compared with those for 1939.

	1942.	1939.
Refined copper ...	270,600	232,000
Refined lead	243,800	191,000
Refined nickel ...	93,300	64,500
Refined zinc	216,000	175,600

The figures for 1942 are impressive enough but those for 1943 will still be better, thanks to further expansion in nickel production, and a larger output of zinc and copper, some of which is coming from new producers. It is estimated that this year Canada's aggregate production of refined copper, nickel, lead and zinc will reach 827,800 tons, as compared with a combined output of 662,100 tons in 1939, the last year for which official figures were released, representing an increase of 25 per cent. This remarkable advance in base metal output has not been secured without considerable sacrifices on the part of the established producers. Certain major deposits have been mined at an abnormal rate and reserves have been seriously depleted. Apart from a few concessions with respect to write-offs on new plant construction, the Canadian base-metal industry has carried on at price levels almost identical with those which prevailed before the war.

Bronze Welding

New Type of Rod Developed

BRONZE welding equipment has been usefully supplemented by the production of "Sibrods," the latest addition to the range of jointing alloys prepared by JOHNSON MATTHEY & CO., LTD., 73/83 Hatton Garden, London, E.C.1. Uses of the new material are given in a descriptive leaflet.

When bronze-welding, "Sibrods" are used to fill a groove or to build up a fillet by methods similar to those employed in torch welding, with the advantage that, owing to a relatively low melting-point, there is considerable latitude in the conditions necessary to make satisfactory joints. When brazing, the molten brazing metal is caused to flow between the close-fitting surface of the joint, and it is not usual to bevel the edges before the parts are fitted together.

"Sibrods" require a slightly oxidising flame for bronze welding. Using oxy-acetylene equipment, the correct flame is ensured by first producing a neutral flame and then throttling down the acetylene until a slight excess of oxygen is obtained. A "leftward" welding movement has been found highly successful. In brazing, the work is cleaned and fluxed and heated, by general rather than local application of the torch, to the flowing temperature, and the rod is melted more by the heat of the work than by direct application of the flame to the rod. The rod is fed to the joint immediately behind the flame, and the molten metal flows to the hottest portion of the joint.

These rods are applicable to a wide range of metals including copper, bronzes and brasses, cast iron, malleable iron and steels. Successful repairs have been made on 60/40 yellow brass castings, using the bronze welding technique. Light alloys and materials melting or softening below 870° C. cannot be joined with "Sibrods."

Amended British Standards

Brass Bars

AN amendment slip has just been issued to B.S. 249, 250, 251, and 252, British Standard Specifications for Brass Bars, giving modified tolerances for extruded bars. This increase in tolerances has been allowed as a war emergency measure in order to obtain greater life from the dies. Provision is also made for bars of rectangular section to be included in the specifications, but the tolerances to be allowed on the dimension of the bars vary to such an extent according to the shape of the cross section that it has not been possible to give dimensional tolerances, so it is specified that in all cases these should be agreed between the purchaser and the manufacturer.

Steel

An amendment slip to B.S. 970 has also just been issued by the B.S.I.; under the reference P.D. 145, which provides for a revised specification for steel En. 100 and a new steel En. 110. The amendment indicates that this steel, which is primarily for bars for machining, may also by agreement between purchaser and manufacturer be used for bars for forging and drop forging. It also provides for a new specification for a steel with low contents of nickel, manganese and molybdenum. This steel has been standardised in order to utilise to the greatest advantage the low content of steel scrap. The material is intended as a substitute for steels to Specifications En. 16, 17, and 19 and covers ranges from 45-70 tons per sq. in. In view of these additions that have been made to the schedule, certain alterations were necessary to the direction issued by the Iron and Steel Control with regard to steels in B.S. 970, and these modifications are covered by amendment slip P.D. 145.

Copies of these amendment slips are obtainable on application to the B.S.I., 28 Victoria Street, London, S.W.1.

General News—From Week to Week

A useful glossary of the synonyms used for the various sex hormones has been published by the Pharmaceutical Press, Bloomsbury Square, W.C.1, price 1s., postage paid.

The substitution of removable for permanent black-out at a number of vital factories is to be carried out as quickly as material and man-power will permit, according to a statement by the Minister of Home Security.

The Ministry of Food announces that there will be no change in the existing prices of oils and fats allocated to primary wholesalers and large trade users during the five weeks ending October 30.

A consolidating Order—the Trading with the Enemy (Specified Persons) (Amendment) (No. 13) Order, 1943 (S.R. & O. 1943, No. 1290)—embodies the current lists of specified persons with whom dealings of any kind are unlawful, and costs 4s.

It can now be revealed that the dismantling of the airship mooring tower at Cardington by Cox & Danks, Ltd., has been completed. This task was accomplished well inside scheduled time, and 300 tons of steel are now being used for arms production.

The Brassfounders' Employers' Association, at its meeting last week, decided to change its name to the National Brassfoundry Association. This step was regarded as desirable in view of the recent rapid development of the association's activities and range.

A travelling exhibition, now at Caxton Hall, Westminster, is to be sent to collieries and village halls in mining areas. Planned by the Pit Relations Section of the Ministry of Fuel and Power, it shows the uses of coal not only as a fuel but as a basis for the production of electricity, gas, by-products and plastics.

The first of the three parts of the programme for rebuilding the ovens of Thorncliffe Coal Distillation, Ltd. (controlled by Newton Chambers & Co.) was completed last August, but meanwhile the old ovens have deteriorated more rapidly than expected, and the rebuilding cannot be completed before next July.

A night watchman, F. A. Smith, of Ballsall Heath, Birmingham, who tried to dry-clean his trousers by dipping them in industrial trichlorethylene, was killed by the fumes given off by the chemical. Returning a verdict of misadventure, the Coroner, Dr. W. H. Davison, said that Smith, after saturating the trousers, took them into a shelter where, it was said, he had no business to be, turned on an electric radiator, and went to sleep.

The Minister of Economic Warfare, the Earl of Selborne, stated last week that the British and U.S. Governments reserved the right to treat as invalid any transfer to neutral ownership of any enemy-owned rights or interests in property in Italy. Firms in neutral countries which acquired such interests laid themselves open to all sanctions at the disposal of the two Governments.

The formation of an X-Ray Analysis group of the Institute of Physics is announced, with Sir Lawrence Bragg as chairman and Dr. H. Lipson as hon. secretary and treasurer. The inaugural meeting will be held at Manchester on October 16, with an opening lecture by the chairman on "The Physical Optics of X-Ray Analysis." All those interested in the group should send their names and addresses to Dr. Lipson, The Crystallographic Laboratory, Free School Lane, Cambridge.

Auxiliary petrol tanks made from paper are now being used by our Typhoons and other fighter aircraft. Known as jettison tanks because they can be discarded by the aircraft when necessary, these containers carry the extra fuel required by our fighters for long-range activity. The tanks are made in three sections, each consisting of layers of paper, bonded together with an adhesive, and moulded over a cast to the required shape. After they have been dried and sandpapered, the three sections are assembled and a band of wood inserted at the joints. Small metal fitments are then added, after which the tank is "doped" and finally sprayed with silver cellulose paint.

Foreign News

Production of mercury in Spain last year is estimated at more than 85,000 flasks.

A new zinc deposit in Agua Prieta, Mexico, is being developed.

A new cement plant is now operating at full capacity at Guadalajara, Mexico.

A de-tinning plant financed by the U.S. Government and costing $1,500,000, is to be built in Alabama.

U.S. Army musicians are now being provided with fifes made from cellulose acetate butyrate.

Spain's nickel output was more than doubled last year, 560 tons of nickel ore being mined.

Portuguese farmers are being encouraged to grow pyrethrum, needed for agriculture, household use, and as a mosquito repellant.

A natural gas pipe line from the United States to the zinc refinery at Rosita, Mexico, is nearing completion.

The Argentine State oilfields last year produced 2,445,580 cubic metres of oil, or about ten per cent. more than in 1941.

A modern wood-treating plant is to be established at Clarenville, Newfoundland, at a cost of $250,000.

The Russian Academy of Sciences has elected Marshal Stalin as a member, states Moscow radio.

The Argentine National Department of Military Factories is preparing to produce synthetic rubber from alcohol.

The capacity of the iron and steel foundry at Monterrey, Mexico, has been increased from 700 to 1200 tons of pig iron a day by the completion of a new plast furnace.

Every municipality in Puerto Rico holds a stock of 10,000 sulphadiazine tablets, issued by the State for use in case of influenza epidemics.

Producer-gas vehicles in the world are now estimated to total 600,000, stated Dr. G. Egloff at a recent American Chemical Society meeting.

Plastic water pipes are being made in Canada in sizes up to 1½ in. diameter. One of their advantages is lightness, their weight being less than one-fifth that of cast-iron.

The copper-recovery campaign of America's War Production Board has so far released 197,000,000 lb. of "idle and excessive" copper, both in primary and fabricated forms, for war use.

Chile's first lead smelter began operations in June. The smelter is the property of the Sociedad Minera "Condoriaco" and is situated at Las Canas, about 25 miles from Vallenar.

The quinine pool in the United States has now reached a total of 136,000 oz., received from 16,573 contributors, representing less than half the estimated number of pharmacies in non-malarial parts of the country.

To exploit limestone deposits on the island of Alnö, Sweden, a plant costing 150,000 crowns is under construction. It is estimated that approximately 28,000,000 metric tons of limestone, with a lime content of 90 per cent., are available.

Heels of boots and shoes are being made from synthetic material in Sweden, nitrocellulose forming the basis of this ersatz leather. It is admitted that it is not yet suitable for soles, as it breaks too easily at low temperatures.

A Joint Supply Council has been established in the Union of South Africa, it is announced from Pretoria. The chairman is Mr. H. J. van der Bijl, Director-General of Supplies for South Africa. Lord Harlech, High Commissioner, represents the United Kingdom: and Mr. Lincoln McVeagh, U.S. Minister, the United States.

Increasing need of silver for essential war industries has led to the U.S. War Production Board requesting some 1400 manufacturers to make returns of stocks of metal which have been rendered idle by W.P.B. restrictions on its use.

Alcohol production in Szechwan Province, China, totalled in 1941 almost 5,000,000 gallons, 15 per cent. more than the year before. 3,248,000 gallons were produced in private factories, and 1,712,000 in publicly-owned plants.

Seven brand-new aluminium plants on the West Coast of America, with a total capacity of 21,000,000 lb. monthly, have been idle for lack of man-power since their completion, states the W.P.B. Meanwhile, other similar units are being completed elsewhere.

A deposit of kieselguhr covering an area of 10 hectares has been discovered at Molleröd, in the Province of Skane, Sweden. It offers possibilities of yielding 68,000 cubic metres of kieselguhr, which is equal to 27,000 metric tons of dry kieselguhr in final processed form.

Through the formation of the Imperial Magnesium Co., by the merger of the Toa Light Metals Co., and the Okura Magnesium Mining Co., Japan's self-sufficiency in light metals has been further increased, claimed Tokyo radio recently. The new company has a capital of 20,000,000 yen.

Kenya's Pyrethrum Board has been asked by the British Ministry of Supply to send 10,000 lb. of pyrethrum seed to the United States Board of Economic Warfare. The seed will be flown across the Atlantic, and will probably be planted in Brazil to increase the supplies of this important insecticidal material.

About thirty buildings of I.G. Farbenindustrie's chemical works at Ludwigshaven—one of the greatest plants of its kind in the world—were damaged in the R.A.F.'s Thunderbolt attack last week. The ammonia synthesis plant, one of the most vital sections, was still blazing twelve hours after the asault.

Forthcoming Events

A meeting of the Yorkshire section of the **Society of Chemical Industry** will be held in the Metropole Hotel, King Street, Leeds, on **October 4**, at 6 p.m. Papers will be presented on "The Economic Size of Plant Units," by Mr. C. Cooper, M.Sc., and "Improving a Food-Manufacturing Process," by Mr. E. F. Heaton, B.Sc., A.I.C.

The London section of the **Society of Chemical Industry** is holding a meeting at 2.30 p.m. on **October 4** in the rooms of the Chemical Society, Burlington House, Piccadilly, when Mr. S. J. Johnstone, B.Sc., F.I.C., M.Inst M.M., will lecture on "The

Organisation and Use of Technical Intelligence Services."

Sir John Russell, F.R.S., will address a joint meeting of the **Society of Chemical Industry,** Manchester section, and the Manchester Literary and Philosophical Society at the University, Oxford Road, on **October 5,** at 5.30 p.m. His subject will be "Agricultural Reconstruction in Europe after the War."

The Road and Building Materials Group of the **Society of Chemical Industry,** and the **Oil and Colour Chemists' Association** is holda joint meeting at No. **1** Grosvenor Place, S.W.1, at 5 p.m., on **October 7.** Dr. V. G. Jolly, F.I.C., will lecture on "Progress in Paints and Painting."

The Bristol section of the **Society of Chemical Industry** meets at 6 p.m. on **October 7** to hear the jubilee memorial lecture by Sir Robert Robertson entitled "Diamond." This lecture will be delivered also to the meeting of the **South Wales Section** at 3 p.m., in the Lecture Theatre, University College, Cardiff, on **October 9.**

A meeting of the Northampton group of the British Section of the **Society of Leather Trades' Chemists** will be held at the College of Technology, Northampton, on **October 9,** at 2.15 p.m., when Mr. E. Waters, B.Sc., will read a paper on "Colorimetry, The Science of Colour Measurement."

A joint meeting of the **Microchemical Club,** the South Yorkshire section of the **Royal Institute of Chemistry,** and the **Sheffield Metallurgical Association** to be held at the Department of Applied Science, St. George's Square, Sheffield, on **October 9,** at 2.30 p.m., will be devoted to a symposium on "Microchemical Analysis." Papers will be presented by Drs. G. H. Wyatt and Cecil M. Wilson, and Messrs. C. Whalley, J. J. Stock, G. Ingram and W. B. Price. In conjunction with this meeting an exhibition and demonstration of microchemical apparatus is being arranged, to be open from 10 a.m. to 1 p.m. on the day of the meeting.

Mr. F. Thomas, M.Sc., F.I.C., will give a lecture entitled "Some Observations on American progress in the Manufacture and Use of Synthetic Rubber" at a meeting of the Midland Section of the **Institution of the Rubber Industry** on **October 11,** at 7 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham.

At the meeting of the **Chemical Society,** Leeds area section, on **October 12** in the Chemistry Lecture Theatre of Leeds University, Dr. E. H. Farmer will lecture on "Autoxidation in Relation to Olefinic Structure."

The joint meeting of the **Society of Chemical Industry,** and the **Institution of Chemical Engineers** on **October 12** will hear an address by Lord McGowan entitled "The Future of the Chemical Industry." The meeting is at 2.30 p.m. at the Institution of Mechanical Engineers, Storey's Gate, S.W.1

The **Society of Chemical Industry's Food Group** meets on **October 13,** at 3 p.m., in the Chemical Society's rooms, to hear papers under the general title of "Anti-oxidants," by Professor Hilditch, F.R.S., and Dr. F. Bergel.

Professor C. R. Harington's jubilee memorial lecture on "The Contribution of Chemistry to Immunology" will be delivered at a meeting of the Newcastle section of the **Society of Chemical Industry,** in the Physics Theatre, Newcastle University, on **October 13,** at 5 p.m.

The annual luncheon of the **Institute of Fuel** will be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on **October 14,** at 12.30 for 1 p.m. The luncheon will be followed at 2.30 p.m. by the annual meeting at the same place, when Dr. E. S. Grumell, C.B.E., will be presented with the Melchett Medal and will then give the Melchett Lecture, to be followed by Dr. E. W. Smith's presidential address.

The third set of lectures on fuel economy arranged by the **Association of British Chemical Manufacturers** will be given on **October 15,** at 2.30 p.m., in the Geological Society's rooms, Burlington House, Piccadilly, W.1. The subjects will be "Grinding" and "Dryers, Heat and Mechanical" Brief introductions by Mr. J. C. Farrant (International Combustion, Ltd.) and Mr. F. R. Farmer (Kestner Evaporator & Engineering Co., Ltd.) will be followed by discussion. Non-members of the Association are invited to the meeting and should notify Mr. A. J. Holden (The Association of British Chemical Manufacturers, 166 Piccadilly, London, W.1) not later than October 13.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

F. R. DAWSON (SQUARES), LTD., Wigan, manufacturing chemists. (M., 2/10/43.)—September 13, mortgage to District Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land and buildings at Rodney Street, Wigan. *——. November 22, 1941.

ADVANCED PATENT PROCESSES, LTD., London, W., chemical manufacturers. (M., 2/10/43).—September 9, £100 and £200 debentures, respectively to H. A. Gwynne and Edith Gwynne, both Dunmow; general charges.

CAMPBELL INDUSTRIES, LTD., London, S.E., manufacturers of materials from seaweed, etc. (M., 2/10/43).—September 6, series of £2500 debentures, present issue £1000; general charge. *Nil. December 30, 1942.

THOMPSON & STEVENS, Ltd., Radcliffe, rubber manufacturers. (M., 2/10/43.) —September 8, £2000 debentures; general charge. *£630. January 20, 1943.

Satisfaction

CHAMPION DRUCE & CO., LTD, London, N., paint manufacturers. (M.S., 2/10/43.)—Satisfactions September 8, of trust deed registered July 28, 1930, of supplemental mortgage registered July 28, 1936, and of deed and charges registered April 20, 1939.

Company News

Thorncliffe Coal Distillation, Ltd., report a net profit, for the year ended June 30, of £21,830 (£48,659). An interim dividend of 25 per cent. (same) is being paid.

The Paterson Engineering Co., Ltd., is paying a first and final dividend of 10 per cent. for the year ended April 30, plus a bonus of 2½ per cent. (same).

The Electrolytic Zinc Co. of Australasia, Ltd., announce a final dividend of 5 per cent. on both ordinary and preference shares for the year ended June 30, making 9 per cent. (same).

Low Temperature Carbonisation, Ltd., announce a trading profit of £164,798 (£131,787) for the year ended March 31. Dividend is 4 per cent. (3½ per cent.), and carry-forward £34,418, an increase of £1545.

National Fertilizers, Ltd., after paying preference dividend and an interim ordinary dividend of 6¼ per cent. (5 per cent.), showed a balance of £10,000 for the 15 months to September 30. Final ordinary dividend, 5 per cent. (nil).

New Companies Registered

Marsh & Co. (Chemicals), Ltd. (382,772). —Private company. Capital: £500 in 500 shares of £1 each. Manufacturers of chemicals, oils, colours, etc. Subscribers: A. G. Sanders; Joseph Bolton. Secretary: C. W. Hesketh. Registered office: 396 Scotland Road, Liverpool.

Holoplast, Ltd. (382,678).—Private company. Capital: £140,000 in 100,000 redeemable preference and 40,000 ordinary shares of £1 each. The company acquires the whole of the undertaking of or shares in Aerolectric Mouldings, Ltd., and will carry on the manufacture of and wholesale and retail dealings in synthetic-resin-bonded laminated products, and fabric materials. Directors: Guy P. Harben; Desiré Gonda; Clement I. Casey; Walter J. Worboys; Gavin S. McClay; and Sir Percy H. Mills. Solicitors: Halsey, Lightley and Hemsley, 32, St. James Place, S.W.1.

Chemical and Allied Stocks and Shares

ALTHOUGH the excellent trend of the war news maintained a firm undertone in most sections of the Stock Exchange, sentiment was inclined to reflect modifications of the optimistic views in regard to the duration of the war which were recently current in the market. This explains the easier tendency that has developed among some industrial shares which recently showed a strong advance on hopeful views as to the long-term outlook. In most instances, however, declines on balance have been very small and steady features were not lacking among the leading industrials, such as Imperial Chemical and Turner & Newall. Under the lead of gilt-edged securities a firmer tendency was shown in investment stock of the fixed-interest-bearing type.

Imperial Chemical at 38s. 7½d. were the same as a week ago, as were the 7 per cent. preference units at 34s. 6d. B. Laporte continued to hold their recent rise, dealings having been recorded around 80s. Murex remained at 101s. 10½d., awaiting the forthcoming dividend announcement. Dunlop Rubber at 40s. were also unchanged on balance. On the other hand, Lever & Unilever eased further to 36s. 3d. and Lever N.V. were 34s. 3d., compared to 35s. a week ago. Moreover, on further consideration of the financial results, Triplex Glass 10s. ordinary at 37s. 6d. lost a further small part of the strong advance shown earlier in the month. W. J. Bush remained at 55s. The units of the Distillers Co. continued in demand, and further improved from 90s. to 90s. 9d., while at 32s. 3d. United Molasses more than maintained the rise recorded a week ago. Wallpaper Manufacturers deferred units reacted further to 40s. 6d. A decline was shown on various other shares which had recently responded to hopeful market assumption as to the possibility of rising profits and dividends after the war. Turner & Newall were well maintained at 79s. 3d. There was a better tendency also in Associated Cement ordinary at 64s. 6d. British Plaster Board 5s. shares improved to 29s. Burt Boulton were 20s., and Lawes Chemical 10s. shares were quoted at 12s.

There was rather more activity in various

shares of companies connected wih plastics. **Thomas De La Rue** were outstanding with an advance to 172s. 6d. **British Industrial Plastics** 2s. ordinary changed hands around 6s. 10½d., **Lacrinoid Products** around 5s.; and **Catalin** around 3s: 3d., while, awaiting the financial results, Erinoid 5s. ordinary were again 12s. 6d. At 80s. 9d. British Oxygen more than maintained last week's rise. Elsewhere, Imperial Smelting were unchanged on balance. British Aluminium, however, eased to 46s. 9d., British Match to 39s. 3d., and Borax Consolidated to 37s. 6d. Nairn & Greenwich kept at 68s. 9d., and Barry & Staines at 43s. 6d. A better tendency was shown among textiles, including Bradford Dyers at 22s. 3d., and Calico Printers at 16s. 6d. Moreover, British Celanese came in for renewed attention and rallied to 34s. 1½d., the assumption being that the forthcoming results and annual statement may confirm hopeful views of the future. Courtaulds at 54s. 9d. were maintained at the same level as a week ago. Elsewhere, Blythe Colour 4s. ordinary have changed hands at 8s. 3d., and British Emulsifiers around 3s. 4½d., while Greeff-Chemicals 5s. ordinary were 7s. 9d. British Indestructo Glass 2s. ordinary have shown activity around 5s. 4½d., and at one time Webb's Crystal Glass ordinary changed hands around 6s. 9d. In other directions, Fisons were 51s. 3d., and Cellon 5s. ordinary were 22s. 6d. Goodlass Wall 10s. shares continued to be dealt in around 16s. B.D.H. ordinary were quoted at 23s. 6d.

Boots Drug at 43s. 4½d. were virtually the same as a week ago. Timothy Whites eased to 33s. 7½d. after an early rise. Sangers remained at 23s. 10½d., and Beechams deferred were little changed at 17s. 6d. Among iron and steel shares, Dorman Long were prominent, having risen on balance from 27s. 4½d. to 29s., while Guest Keen were better on balance at 34s. 9d. On the other hand, Stewarts & Lloyds eased to 53s., Tube Investments to 92s. 9d., and United Steel to 24s. 10½d. There has been an easier tendency among oil shares, including Anglo-Iranian, Burmah Oil and Shell.

British Chemical Prices

Market Reports

ACTIVITY in the general chemicals market in London during the past week has been fairly widespread and nearly all sections report strong price conditions. There has been practically no alteration in the general supply position and makers' deliveries against contracts are reported to be satisfactory. The majority of the soda products are quoted at strong rates with bichromate, yellow prussiate, and chlorate of soda being called for in greater quantities than are at present available. In the potash section permanganate of potash and caustic potash are in strong demand while yellow prussiate of potash continues scarce with quotations more or less nominal. Acid phosphate of potash is a good market. In other directions formaldehyde is in good call, and arsenic, borax, and crude and refined glycerine remain steady and firm. Barium chloride is in good demand. A quiet trade is reported for most of the coal-tar products and deliveries against existing commitments have been on a fairly good scale. A steady movement has taken place in creosote oil, carbolic acid, and cresylic acid. Solvent naphtha and the xylols are a quiet market and a moderate inquiry is reported for pitch.

MANCHESTER.—Very steady trading conditions have been reported on the Manchester chemical market during the past week. New inquiries have been in circulation and a moderate weight of replacement business has been recorded in the leading heavy materials. With regard to actual movements into consumption, there has been a steady flow of delivery and specifications covering caustic soda and many of the other soda products, while the call for the general run of potash chemicals continues in excess of the quantities available. The heavy acids are being taken up in good quantities. Taking the chemcal market as a whole, the price position remains very strong.

SITUATION VACANT

None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

WORKS Chemist required by well-established manufacturers of household products, operating under the Essential Works Order. Applicant must have excellent knowledge and experience of soaps, detergents, disinfectants and their raw materials. Also able to analyse and match specimen products. Applications (which will be treated in strict confidence) stating particulars of experience and salary required to Box No. 2132, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

THE INSTITUTION OF CHEMICAL ENGINEERS.

EXAMINATION, 1944.

APPLICATION Forms (returnable 1st December 1943) and particulars of the Associate-Membership Examination for 1944 may be obtained from the Hon. Registrar, Institution of Chemical Engineers, 56 Victoria Street, Westminster, London, S.W.1.

Second-hand
HYDRO EXTRACTORS
for sale.

THREE 48 in. dia. belt driven HYDRO EXTRACTORS, by Broadbent; perforated copper basket 48 in. dia. by 16 in. deep; monitor casing carried on suspension pillars; underdriven through jockey pulleys from separate self-contained countershaft.

One 36 in. dia. floating basket type underdriven HYDRO EXTRACTOR; perforated steel basket 36 in. dia. by 15 in. deep; underdriven by belt from self-contained countershaft; friction clutch drive.

One 32 in. dia. underdriven type HYDRO EXTRACTOR, by Manlove Alliott; perforated galvanised steel basket 32in. dia. by 11 in. deep; cast iron monitor casing.

One 30 in. dia. HYDRO EXTRACTOR, by Emil Muhlmann Vierson; copper perforated basket 2 ft. 6 in. dia. by 1 ft. 3 in. deep; underdriven by means of self-contained countershaft.

One 30 in. dia. HYDRO EXTRACTOR, by American Laundry Machinery Co.; perforated galvanised steel basket 30 in. dia. by 14 in. deep; underdriven through f. & l. pulleys from self-contained countershaft.

One 24 in. dia. suspended type self-contained Chemical HYDRO EXTRACTOR, by Broadbent; perforated steel basket 24 in. dia. by 18 in. deep; mounted on fabricated steel supporting structure and arranged with overhead drive; conical discharge to basket.

One 24 in. dia. floating basket type underdriven HYDRO EXTRACTOR, by Manlove Alliott; perforated steel basket 24 in dia. by 13 in. deep; underdriven through f. & l. pulleys from self-contained countershaft.

One 20 in. floating basket type HYDRO EXTRACTOR, by Broadbent; perforated galvanised steel basket 20 in. dia. by 10 in. deep; underdriven through f. & l. pulleys from self-contained countershaft; fitted with interlocking hinged cover.

GEORGE COHEN, SONS & CO., LTD.,
STANNINGLEY, near LEEDS, and
WOOD LANE, LONDON, W.12.

'Phone 98 Staines.

C.I. Jacketed Pan, 25 in. by 20 in.: Electric Hydro Extractor, 36 in., 415/3/50: 100 gallon Jacketed enclosed Mixing Pan: Tubular Condenser, 500 square feet: Filter Press, 23 chambers, 26 in. square: 20 ft. Worm Conveyor.

HARRY H. GARDAM & CO., LTD.,
STAINES.

100 REBUILT Hydro Extractors by all leading makers from 18 in. upwards with countershafts attached and safety covers. Jacketed Steam Pans, various sizes. List on request. Seen at Randalls, Arundel Terrace, Barnes. Telephone: Riverside 2436.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills, Preston, Lancs. Phone 2198.

TWELVE 400-ton Cake Presses, W.P. 2 tons, Tables 36 in. by 18 in., suitable for conversion for moulding. THOMPSON & SON (MILLWALL), LTD., Cuba Street, Millwall, London, E.14. East 1844.

WANTED

MANUFACTURERS of Fire Lighters wish to contact firms who can undertake in contract hot mixing of regular quantities of various inflammable materials. Reply to OLEUM BY-PRODUCTS, LTD., 38 Lombard Street, E.C.3. Telephone: Mansion House 9434/5.

SUGAR Coating Pan, if possible complete with standard A.C. motor drive for 240 V. A.C., Manesty preferred but details of others welcomed. Box No. 2135, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

WANTED.—Supplies of Nitre-Cake in ten ton lots. Box No. 2126, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

SERVICING

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

MONOMARK. Permanent confidential London address. Letters redirected. 5s. p.a. Royal patronage. Write:—BM/MONO3C, London, W.C.1.

PATENTS & TRADE MARKS

THE Patentees of British Patents Nos. 470,864 entitled "Asphaltic Product and Method of Producing Same," 474,240 entitled "Manufacture of a New Phenol Derivative and its Use for the Preparation of Mineral Oil Compositions," and 491,323 entitled "Manufacture of Reaction Products of Alkylated Aromatic Hydroxy Compounds and Compositions containing the Products," are desirous of entering into arrangements for the granting of Licences to manufacture under these patents. All enquiries should be addressed to F. J. CLEVELAND & COMPANY, chartered Patent Agents, 29 Southampton Buildings, London, W.C.2

WORKING NOTICE

THE Proprietors of the Patent No. 521,240 for "Dipilatory" are desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance to, Haseltine Lake & Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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